

Lake City Army Ammunition Plant  
Independence  
Jackson County  
Missouri

HAER No. MO-22

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WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record

HAER  
MO,  
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HISTORIC AMERICAN ENGINEERING RECORD

Lake City Army Ammunition Plant

MO-22

Location: In Jackson County, Missouri, eight miles east of Independence.

Date of Construction: Established in 1940.

Owner: Department of the Army

Significance: Established in 1940 for the manufacture of small arms ammunition, Lake City Army Ammunition Plant was the first of six similar facilities, and its major buildings served as prototypes for four other plants.

Historical Report  
Prepared by: Jeffrey A. Hess, 1984.

Prepared for  
Transmittal by: Robie S. Lange, HABS/HAER, 1985.

## EXECUTIVE SUMMARY

The Lake City Army Ammunition Plant (LCAAP) is part of the Army's Armament, Munitions and Chemical Command (AMCCOM). It is a government-owned, contractor-operated installation situated on 3900 acres about eight miles east of Independence, Missouri. Constructed during 1940-1942 for the manufacture of small arms ammunition, the LCAAP was the first of six similar facilities, and its major administrative and manufacturing buildings served as prototypes for four other plants. Designated a standby plant after World War II, the installation was reactivated for the Korean War and subsequently maintained as an active facility. During the mid-1950s, the LCAAP's technological capabilities were expanded with 20-mm manufacturing facilities, and during the late 1970s, the plant received a new, highly innovative production system for 5.56-mm ammunition developed under the Small Caliber Arms Modernization Program (SCAMP).

Currently, the LCAAP is the only active, government-owned, contractor-operated manufacturing facility for small arms ammunition. The installation comprises approximately 420 building, almost half of which date from the original construction period. Apart from the .20-mm equipment installed after the Korean War, and the revolutionary new SCAMP machinery, the LCAAP's technology resembles World-War-II manufacturing practices. Although the plant's existing .30-caliber lines have been retooled for 5.56-mm and 7.62-mm ammunition, these modifications have not significantly altered the original production techniques. The plant's original .50-caliber lines in Building 3 are virtually intact; they are the

country's only functional, .50-caliber assemblage surviving from the World-War-II era.

There are no Category I or Category II historic properties at the LCAAP.

By virtue of their prototype designs, eight original buildings are Category III historic properties: 5.56-mm, SCAMP, Ammunition Building (Building 1); 7.62-mm Ammunition Building (Building 2); .50-Caliber Ammunition Building (Building 3); Administration Building (Building 5); Tool-and-Gage Building (Building 10); Lead Shop (Building 11); Boiler House (Building 15); and Primer Manufacturing Building (Building 35).

## CONTENTS

### Executive Summary

PREFACE . . . . .	1
1. INTRODUCTION . . . . .	3
Scope . . . . .	3
Methodology . . . . .	4
2. HISTORICAL OVERVIEW . . . . .	14
Background . . . . .	14
World War II . . . . .	16
Korean War . . . . .	32
Vietnam War . . . . .	37
3. PRESERVATION RECOMMENDATIONS . . . . .	47
Background . . . . .	47
Category I Historic Properties . . . . .	52
Category II Historic Properties . . . . .	53
Category III Historic Properties . . . . .	53
BIBLIOGRAPHY . . . . .	57

## PREFACE

This report presents the results of an historic properties survey of the Lake City Army Ammunition Plant (LCAAP). Prepared for the United States Army Materiel Development and Readiness Command (DARCOM), the report is intended to assist the Army in bringing this installation into compliance with the National Historic Preservation Act of 1966 and its amendments, and related federal laws and regulations. To this end, the report focuses on the identification, evaluation, documentation, nomination, and preservation of historic properties at the LCAAP. Chapter 1 sets forth the survey's scope and methodology; Chapter 2 presents an architectural, historical, and technological overview of the installation and its properties; and Chapter 3 identifies significant properties by Army category and sets forth preservation recommendations. Illustrations and an annotated bibliography supplement the text.

This report is part of a program initiated through a memorandum of agreement between the National Park Service, Department of the Interior, and the U.S. Department of the Army. The program covers 74 DARCOM installations and has two components: 1) a survey of historic properties (districts, buildings, structures, and objects), and 2) the development of archaeological overviews. Stanley H. Fried, Chief, Real Estate Branch of Headquarters DARCOM, directed the program for the Army, and Dr. Robert J. Kapsch, Chief of the Historic American Buildings Survey/Historic American Engineering Record (HABS/HAER) directed the program for the National Park Service. Sally Kress Tompkins was program manager, and Robie S. Lange was

project manager for the historic properties survey. Technical assistance was provided by Donald C. Jackson.

Building Technology Incorporated acted as primary contractor to HABS/HAER for the historic properties survey. William A. Brenner was BTI's principal-in-charge and Dr. Larry D. Lankton was the chief technical consultant. Major subcontractors were the MacDonald and Mack Partnership and Jeffrey A. Hess. The author of this report was Jeffrey A. Hess. The author would like to thank the many employees at the LCAAP who graciously assisted him in his research and field surveys. He especially acknowledges the help of the following individuals: on the government staff, Dale Pollard, Civilian Executive Assistant; and Paul D. Anthamatten, Chief of Operations Review Division; and on the Remington Arms Company staff, A. H. Smith, Supervisor of Facilities Engineering (Mechanical); Charles Triplett, Land Manager; and Vincent Turner, Facilities Engineer.

The complete HABS/HAER documentation for this installation will be included in the HABS/HAER collections at the Library of Congress, Prints and Photographs Division, under the designation HAER No. MO-22.

## Chapter 1

### INTRODUCTION

#### SCOPE

This report is based on an historic properties survey conducted in June 1983 of all Army-owned properties located within the official boundaries of the Lake City Army Ammunition Plant (LCAAP). The survey included the following tasks:

- . Completion of documentary research on the history of the installation and its properties.
- . Completion of a field inventory of all properties at the installation.
- . Preparation of a combined architectural, historical, and technological overview for the installation.
- . Evaluation of historic properties and development of recommendations for preservation of these properties.

Also completed as a part of the historic properties survey of the installation, but not included in this report, are HABS/HAER Inventory cards for 22 individual properties. These cards, which constitute HABS/HAER Documentation Level IV, will be provided to the Department of the Army. Archival copies of the cards, with their accompanying photographic



negatives, will be transmitted to the HABS/HAER collections at the Library of Congress.

The methodology used to complete these tasks is described in the following section of this report.

### METHODOLOGY

#### 1. Documentary Research

The LCAAP was one of six government-owned, contractor-operated facilities constructed during 1940-1942 for the manufacture of military small arms ammunition.\* Since the plant was part of a larger manufacturing network, an evaluation of its historical and technological significance requires a general understanding of the wartime ammunition industry. To identify published documentary sources on American ammunition manufacturing during World War II, research was conducted in standard bibliographies of military history, engineering, and the applied sciences. Unpublished sources were identified by researching the historical and technical archives of the U.S. Army Armament, Munitions and Chemical Command (AMCCOM) at Rock Island Arsenal.<sup>1</sup> In addition to such industry-wide research, a concerted effort was made to locate published sources dealing specifically with the history and technology of the LCAAP. This

\* By traditional usage, small arms ammunition includes all cartridges containing projectiles with a diameter measuring six-tenths of an inch (.60 caliber) or less.

site-specific research was conducted primarily at the AMCCOM Historical Office at Rock Island Arsenal; the Kansas City (Missouri) Public Library; the Mid-Continent Public Library, North Independence Branch, in Independence, Missouri; and the LCAAP (contractor's archives, Real Property Records Office Archives, Facilities Engineering Office Archives; Administrative Archives). The Missouri State Historic Preservation Office (Missouri Department of Natural Resources in Jefferson City) was also contacted concerning the architecture, history, and technology of the LCAAP but had no pertinent data on the installation.

Army records used for the field inventory included current Real Property Inventory (RPI) printouts that listed all officially recorded buildings and structures by facility classification and date of construction; the installation's property record cards; base maps and photographs supplied by installation personnel; and installation master planning, archaeological, environmental assessment, and related reports and documents. A complete listing of this documentary material may be found in the bibliography.

## 2. Field Inventory

Architectural and technological field surveys were conducted in June 1983 by Jeffrey A. Hess. Following general discussions with Paul D. Anthamatten, Chief of Operations Review Division for the government staff, and A. H. Smith, Supervisor of Facilities Engineering (Mechanical), for Remington Arms Company, the surveyor was provided

with escorts for tours of major manufacturing buildings and a general field survey of all exterior areas at the installation. Charles Triplett, Land Manager, and Vincent Turner, Facilities Engineer, alternated as general guides. Tours of manufacturing buildings were conducted by the area supervisors or production foremen in charge of the various operations.

Field inventory procedures were based on the HABS/HAER Guidelines for Inventories of Historic Buildings and Engineering and Industrial Structures.<sup>2</sup> All areas and properties were visually surveyed.

Building locations and approximate dates of construction were noted from the installation's property records and field-verified. Interior surveys were made of the major facilities to permit adequate evaluation of architectural features, building technology, and production equipment.

Field inventory forms were prepared for, and black and white 35 mm photographs taken of all buildings and structures through 1945 except basic utilitarian structures of no architectural, historical, or technological interest. When groups of similar ("prototypical") buildings were found, one field form was normally prepared to represent all buildings of that type. Field inventory forms were also completed for representative post-1945 buildings and structures.<sup>3</sup> Information collected on the field forms was later evaluated, condensed, and transferred to HABS/HAER Inventory cards.

### 3. Historical Overview

A combined architectural, historical, and technological overview was prepared from information developed from the documentary research and the field inventory. It was written in two parts: 1) an introductory description of the installation, and 2) a history of the installation by periods of development, beginning with pre-military land uses. Maps and photographs were selected to supplement the text as appropriate.

The objectives of the overview were to 1) establish the periods of major construction at the installation, 2) identify important events and individuals associated with specific historic properties, 3) describe patterns and locations of historic property types, and 4) analyze specific building and industrial technologies employed at the installation.

### 4. Property Evaluation and Preservation Measures

Based on information developed in the historical overviews, properties were first evaluated for historical significance in accordance with the eligibility criteria for nomination to the National Register of Historic Places. These criteria require that eligible properties possess integrity of location, design, setting, materials, workmanship, feeling, and association, and that they meet one or more of the following:<sup>4</sup>

- A. Are associated with events that have made a significant contribution to the broad patterns of our history.
- B. Are associated with the lives of persons significant in the nation's past.
- C. Embody the distinctive characteristics of a type, period, or method of construction, represent the work of a master, possess high artistic values, or represent a significant and distinguishable entity whose components may lack individual distinction.
- D. Have yielded, or may be likely to yield, information important in pre-history or history.

Properties thus evaluated were further assessed for placement in one of five Army historic property categories as described in Army Regulation 420-40:<sup>5</sup>

- Category I Properties of major importance
- Category II Properties of importance
- Category III Properties of minor importance
- Category IV Properties of little or no importance
- Category V Properties detrimental to the significance of adjacent historic properties.

Based on an extensive review of the architectural, historical, and technological resources identified on DARCOM installations nationwide, four criteria were developed to help determine the appropriate categorization level for each Army property. These criteria were used to assess the importance not only of properties of traditional historical interest, but also of the vast number of standardized or prototypical buildings, structures and production processes that were built and put into service during World War II, as well as of properties associated with many post-war technological achievements. The four criteria were often used in combination and are as follows:

- 1) Degree of importance as a work of architectural, engineering, or industrial design. This criterion took into account the qualitative factors by which design is normally judged: artistic merit, workmanship, appropriate use of materials, and functionality.
- 2) Degree of rarity as a remaining example of a once widely used architectural, engineering, or industrial design or process. This criterion was applied primarily to the many standardized or prototypical DARCOM buildings, structures, or industrial processes. The more widespread or influential the design or process, the greater the importance of the remaining examples of the design or process was considered to be. This criterion was also used for non-military structures such as farmhouses and other once prevalent building types.

- 3) Degree of integrity or completeness. This criterion compared the current condition, appearance, and function of a building, structure, architectural assemblage, or industrial process to its original or most historically important condition, appearance, and function. Those properties that were highly intact were generally considered of greater importance than those that were not.
- 4) Degree of association with an important person, program, or event. This criterion was used to examine the relationship of a property to a famous personage, wartime project, or similar factor that lent the property special importance.

The majority of DARCOM properties were built just prior to or during World War II, and special attention was given to their evaluation. Those that still remain do not often possess individual importance, but collectively they represent the remnants of a vast construction undertaking whose architectural, historical, and technological importance needed to be assessed before their numbers diminished further. This assessment centered on an extensive review of the military construction of the 1940-1945 period, and its contribution to the history of World War II and the post-war Army landscape.

Because technology has advanced so rapidly since the war, post-World War II properties were also given attention. These properties were evaluated in terms of the nation's more recent accomplishments in weaponry, rocketry, electronics, and related technological and

scientific endeavors. Thus the traditional definition of "historic" as a property 50 or more years old was not germane in the assessment of either World War II or post-war DARCOM buildings and structures; rather, the historic importance of all properties was evaluated as completely as possible regardless of age.

Property designations by category are expected to be useful for approximately ten years, after which all categorizations should be reviewed and updated.

Following this categorization procedure, Category I, II, and III historic properties were analyzed in terms of:

- Current structural condition and state of repair. This information was taken from the field inventory forms and photographs, and was often supplemented by rechecking with facilities engineering personnel.
- The nature of possible future adverse impacts to the property. This information was gathered from the installation's master planning documents and rechecked with facilities engineering personnel.

Based on the above considerations, the general preservation recommendations presented in Chapter 3 for Category I, II, and III historic properties were developed. Special preservation



recommendations were created for individual properties as circumstances required.

5. Report Review

Prior to being completed in final form, this report was subjected to an in-house review by Building Technology Incorporated. It was then sent in draft to the subject installation for comment and clearance and, with its associated historical materials, to HABS/HAER staff for technical review. When the installation cleared the report, additional draft copies were sent to DARCOM, the appropriate State Historic Preservation Officer, and, when requested, to the archaeological contractor performing parallel work at the installation. The report was revised based on all comments collected, then published in final form.

NOTES

1. The following bibliographies of published sources were consulted: Industrial Arts Index, 1938-1957; Applied Science and Technology Index, 1958-1980; Engineering Index, 1938-1983; Robin Higham, ed., A Guide to the Sources of United States Military History (Hamden, Conn.: Archon Books, 1975); John E. Jessup and Robert W. Coakley, A Guide to the Study and Use of Military History (Washington, D.C.: U.S. Government Printing Office, 1979); "Military Installations," Public Works History in the United States, eds., Suellen M. Hoy and Michael C. Robinson (Nashville: American Association for State and Local History, 1982), pp. 380-400. AMCCOM (formerly ARRCOM, or U.S. Army Armament Materiel Readiness Command) is the military agency responsible for supervising the operation of government-owned munitions plants; its headquarters are located at Rock Island Arsenal, Rock Island, Illinois. Although there is no comprehensive index to AMCCOM archival holdings, the agency's microfiche collection of unpublished reports is itemized in ARRCOM, Catalog of Common Sources, Fiscal Year 1983, 2 vols. (no pl.: Historical Office, AMCCOM, Rock Island Arsenal, n.d.).

2. Historic American Buildings Survey/Historic American Engineering Record, National Park Service, Guidelines for Inventories of Historic Buildings and Engineering and Industrial Structures (unpublished draft, 1982).
3. Representative post-World War II buildings and structures were defined as properties that were: (a) "representative" by virtue of construction type, architectural type, function, or a combination of these, (b) of obvious Category I, II, or III historic importance, or (c) prominent on the installation by virtue of size, location, or other distinctive feature.
4. National Park Service, How to Complete National Register Forms (Washington, D.C.: U.S. Government Printing Office, January 1977).
5. Army Regulation 420-40, Historic Preservation (Headquarters, U.S. Army: Washington, D.C., 15 April 1984).

## Chapter 2

### HISTORICAL OVERVIEW

#### BACKGROUND

The LCAAP is a government-owned, contractor-operated installation situated on 3,900 acres approximately eight miles east of Independence, Missouri (Figure 1). Constructed during 1940-1942, the LCAAP was the first of six similar facilities, and its major administrative and manufacturing buildings served as prototypes for four other plants. In 1944, one of the LCAAP's .50-caliber ammunition buildings was converted to .20-mm production. Immediately following V-J Day, the LCAAP suspended its manufacturing activities and assumed the status of a "standby" facility with most of its production lines intact. Reactivated for major production runs during the Korean War, the LCAAP has remained in operation to the present time. During the mid-1950s, the LCAAP was expanded with additional 20-mm manufacturing facilities, and during the late 1970s, the plant received a new, highly innovative production system for 5.56-mm ammunition developed under the Small Caliber Arms Modernization Program (SCAMP).

Currently, the LCAAP is the only active, government-owned, contractor-operated, manufacturing facility for small arms ammunition. The installation comprises approximately 420 buildings, almost half of which date from the original construction period. Apart from the .20-mm equipment installed after the Korean War, and the revolutionary new SCAMP

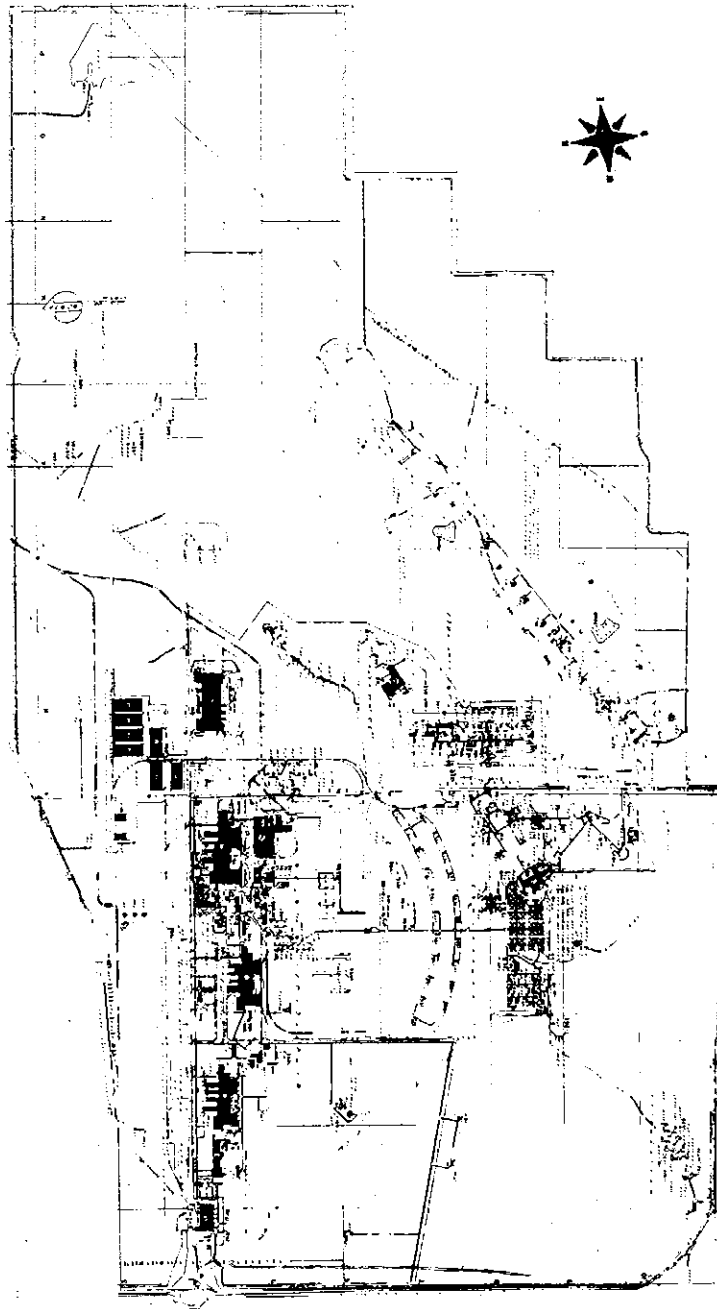


Figure 1: Site plan of the Lake City Army Ammunition Plant. (Source: Drawing No. B.I.M. C-1, 1967, rev. 1983, Facilities Engineer's Office, Lake City Army Ammunition Plant.)

machinery, the LCAAP's technology resembles World-War-II manufacturing practices. Although the plant's existing .30-caliber lines have been retooled for 5.56-mm and 7.62-mm ammunition, these modifications have not significantly altered the original production techniques. The plant's original .50-caliber lines in Building 3 are virtually intact; they are the country's only functional, .50-caliber assemblage surviving from the World-War-II era.

For a more detailed understanding of the LCAAP's architectural and technological history, it is necessary to look more closely at the installation's three major production periods: World War II, the Korean War, and the Vietnam War. Whenever the available data permits, the discussion will focus on specific buildings and processes.

### World War II

When war broke out in Europe in the fall of 1939, the United States had virtually no industrial capability for manufacturing military small arms ammunition. During the 1930s, the only American plant producing such items was the government-owned-and-operated Frankford Arsenal in Philadelphia. Frankford's manufacturing capacity, however, was very limited, and its production lines were antiquated. In 1938-1939, the government took the first steps toward remedying these deficiencies by allocating funds for the modernization of the arsenal's production machinery. At the same time, the arsenal's personnel were instructed to draw up "plans for speeding production in the event of war, including model plant layouts, descriptions of manufacture, estimates of personnel needs, lists of tools and machinery

requirements, and data on commercial sources of raw materials."<sup>1</sup> These production plans laid the groundwork for the construction of six government-owned, contractor-operated, small arms ammunition plants that were built in two "waves" of three plants each during 1940-1942. The first wave included the LCAAP.<sup>2</sup>

#### Site Selection and Former Land Use

The selection of the LCAAP site was governed by the same basic criteria used in evaluating locations for all first- and second-wave plants. These considerations included:

- (1) availability of suitable labor without major housing projects
- (2) proximity to a main railroad line
- (3) availability of adequate electric power
- (4) availability of natural or artificial gas for processing purposes
- (5) ample supply of water for processing purposes
- (6) mid-continental location as a defense against enemy bombardment.<sup>3</sup>

Situated just southwest of the small farming community of Lake City, Missouri, and about 20 miles due east of Kansas City, the LCAAP site satisfied all criteria. The Kansas City area housed a sizeable industrial work force and was a major distribution center for rail freight, electric power, and natural gas. The site's geology also assured an abundance of easily accessible well water. When the federal government purchased the

3,900-acre site in the fall of 1940, the boundaries of the new plant enclosed a mixture of cropland, meadow, and swamp. About thirty-five farm families were forced to relocate. At present, the LCAAP does not contain any structures from this earlier period.<sup>4</sup>

### Construction

Construction work at the LCAAP\* commenced on December 26, 1940, under the general supervision of the Quartermaster Corps.<sup>5</sup> The plant's overall design was the responsibility of Smith, Hinchman & Grylls, Inc. of Detroit, one of the nation's oldest and largest architectural and engineering firms. In developing plans for the manufacturing buildings, Smith, Hinchman & Grylls worked closely with Remington Arms Company, Inc. of Bridgeport, Connecticut, which had been selected to operate the plant on a contract basis. The primary building contractors were Walbridge-Aldinger Co. of Detroit and Foley Brothers, Inc. of St. Paul.<sup>6</sup>

The LCAAP was the first of the new small arms ammunition plants to be designed and constructed, and it served as a prototype for other first- and second-wave plants built under the direction of Smith, Hinchman & Grylls at Denver, Colorado; Des Moines, Iowa; New Brighton, Minnesota; and Salt Lake Lake City, Utah.<sup>7</sup> At all these facilities, architectural form primarily reflected industrial function. For example, the long, horizontal,

\* Throughout the World-War-II era, the LCAAP was officially designated as the Lake City Ordnance Plant, and after the war, it was named the Lake City Arsenal. The plant's current name, which dates from 1963, is used throughout this report for the sake of brevity and clarity.

two-story configuration of the ammunition manufacturing buildings was dictated by the extended, linear arrangement of the production lines on the first floor, which were hopper-fed by conveyor lines on the second floor. To determine the proper shape and dimensions of these buildings, Smith, Hinchman & Grylls used model machinery layouts prepared by Frankford Arsenal during the 1930s, and then literally designed the structures from the inside-out:

A carefully prepared template for each machine is cut out of cardboard and these are then assembled into plans of departments. The machine templates are in color, so that each type may be identified instantly, and colored strips are used to indicate the movement of the materials from one bank of machines to another. Ultimately these department layouts are assembled to form the entire production unit housed in the manufacturing building. Until this point the building exists only as a grid of regularly spaced columns with no limiting walls around them. . . . As the machine layout becomes more definitely established the template plans begin to take the outlines of actual buildings, and where the process requires several stories the plans are set up accordingly. Only at this point does the work . . . move to the main drafting room, where working drawings are begun and orders are placed for hard-to-get items.

Engineering and design features were also shaped by safety and defense requirements. First-floor production areas were generally shielded by blank masonry walls so that workers would be protected from bomb splinters in the event of enemy attack. Surmounting these walls were large expanses of industrial steel sash and monitor skylights, designed to blow outward in case of accidental detonations on the production lines (Figure 2). Power plants were equipped with forced-draft intake systems, "making possible the elimination of the telltale stacks whose long shadows are so useful to hostile bombers in locating the target"<sup>9</sup> (Figure 3). Constructed of steel, concrete, and brick, the main manufacturing and administrative buildings



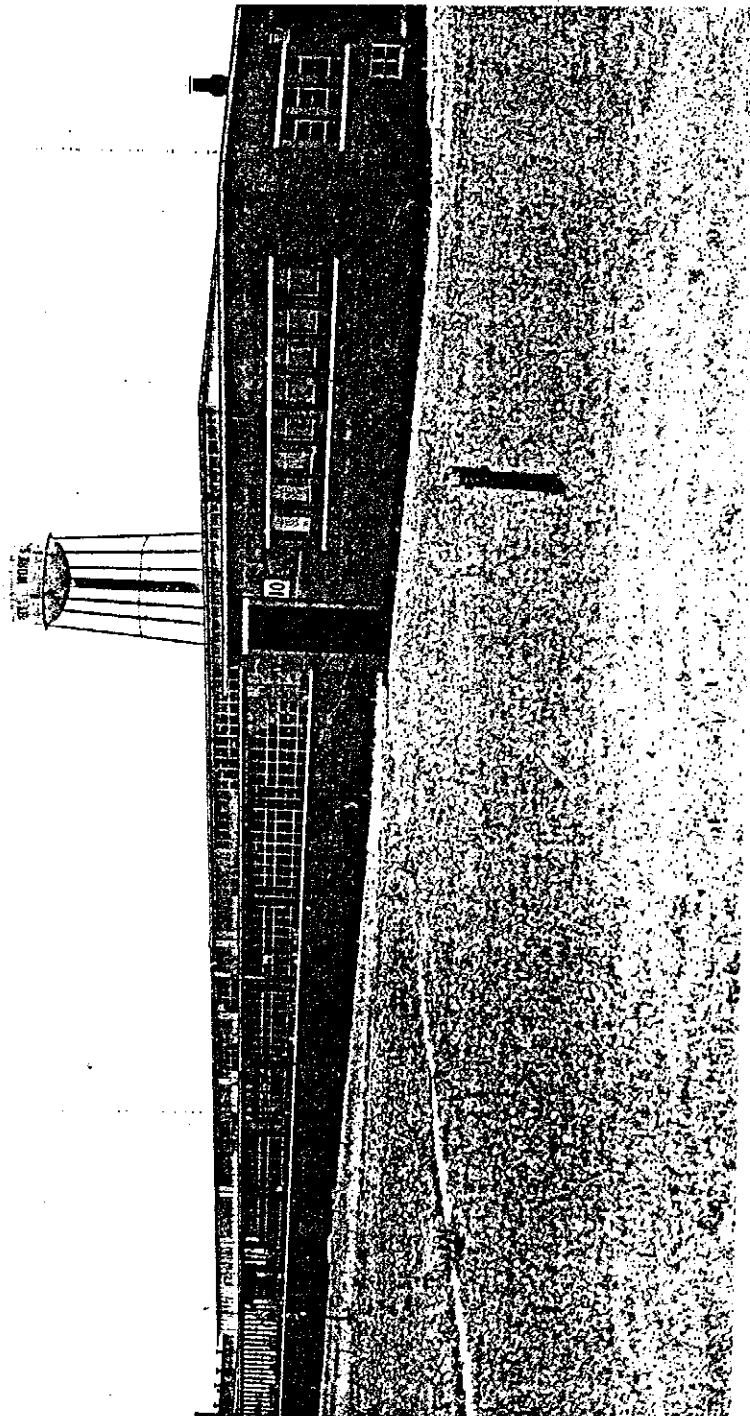


Figure 2: With its extended blocks of industrial steel sash and high masonry walls at ground level, the Tool-and-Gage Manufacturing Building (10) expresses the basic features of the Smith, Hinchman & Grylls design. (Source: "Master Planning, Phase II, Analysis of Existing Facilities," unpublished report, 1947, LCAAP Administrative Archives.)

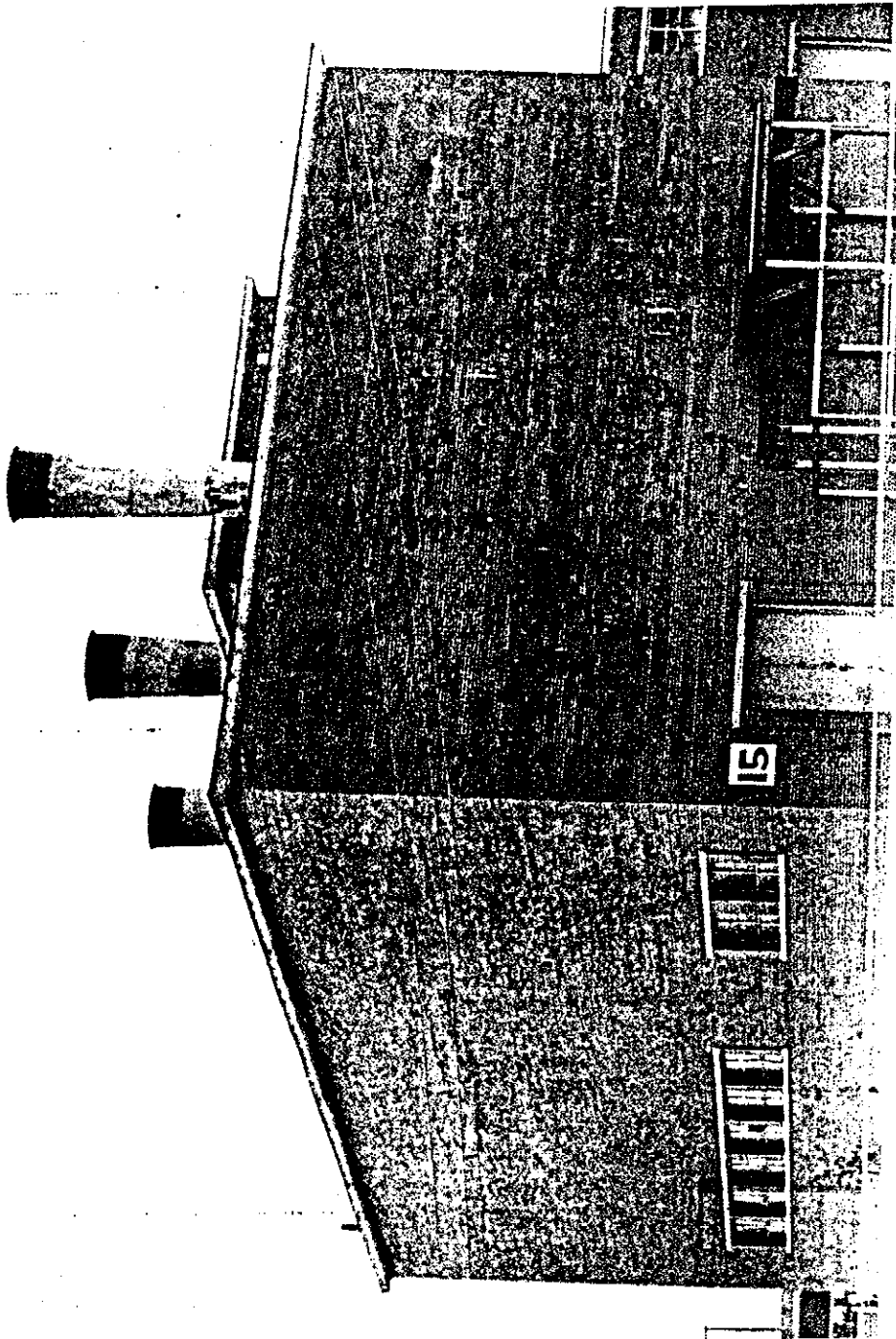


Figure 3: Boiler House (15), designed with short stacks to cast minimal shadows.  
(Source: "Master Planning, Phase II, Analysis of Existing Facilities," unpublished report, 1947, LCAAP Administrative Archives.)

displayed a clean-lined, industrial style that was both attractive and functional.

When the construction program was completed in early 1943, the LCAAP consisted of approximately 350 buildings, most of which served as storage, maintenance, and utility facilities.<sup>10</sup> In terms of size and functional importance, the primary buildings at the site were an Administration Building (Building 5), three 30-caliber Ammunition Buildings (Buildings 1, 2, 4), two .50-caliber Ammunition Buildings (Buildings 3, 3A) a Lead Shop (Building 11), a Primer Manufacturing Building (Building 35), a Power House (Building 15), and a Tool-and-Gage Building (Building 10) (Figures 4-8). The LCAAP also included a small residential district built for supervisory personnel. Located in the southwest corner of the installation, the district contained eleven wood-frame, two-story, American colonial revival houses (Buildings 1141-11411) with detached garages (Figure 9).

### Technology

The LCAAP began manufacturing small arms ammunition on September 12, 1941, and remained in production until August 28, 1945. Over this four-year period, the plant turned out approximately 5.7 billion rounds of small arms ammunition, which accounted for about thirteen percent of the country's total production during World War II. At the conclusion of hostilities, the LCAAP was one of the two government-owned, contractor-operated small arms plants to be retained as "standby" facilities. The plant's production

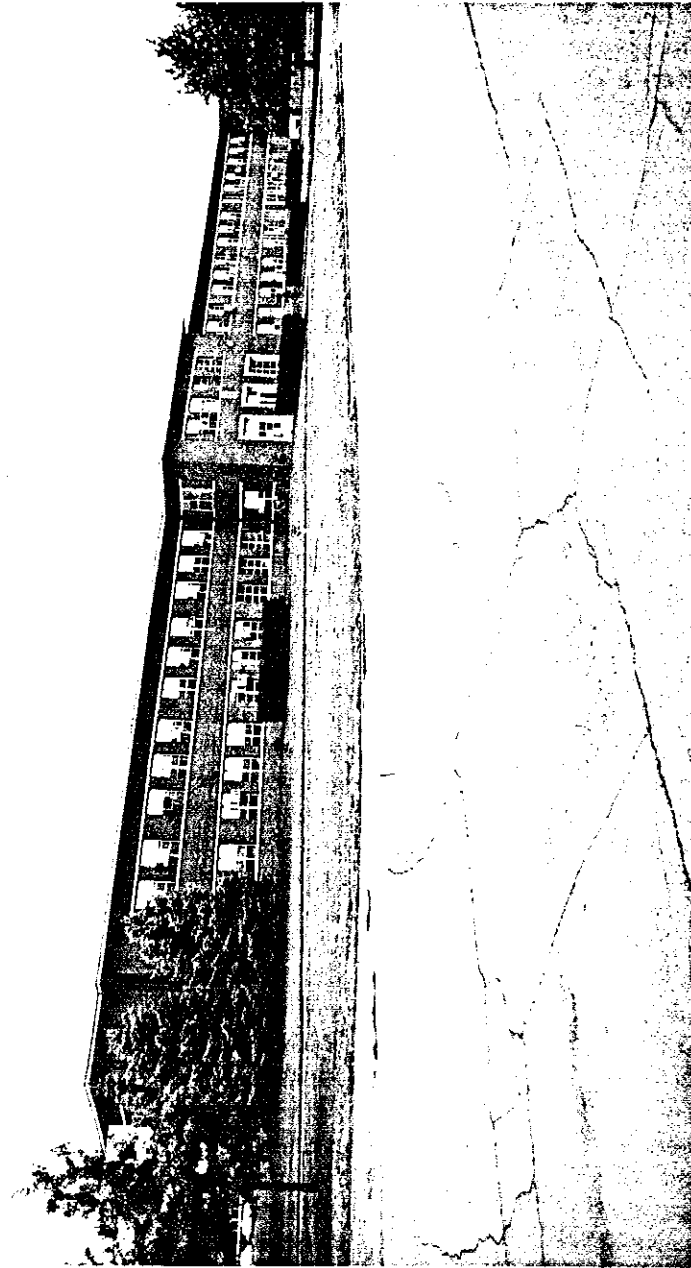


Figure 4: Administration Building (5). (Source: Field inventory photograph, 1983, Jeffrey A. Hess, MacDonald and Mack Partnership.)

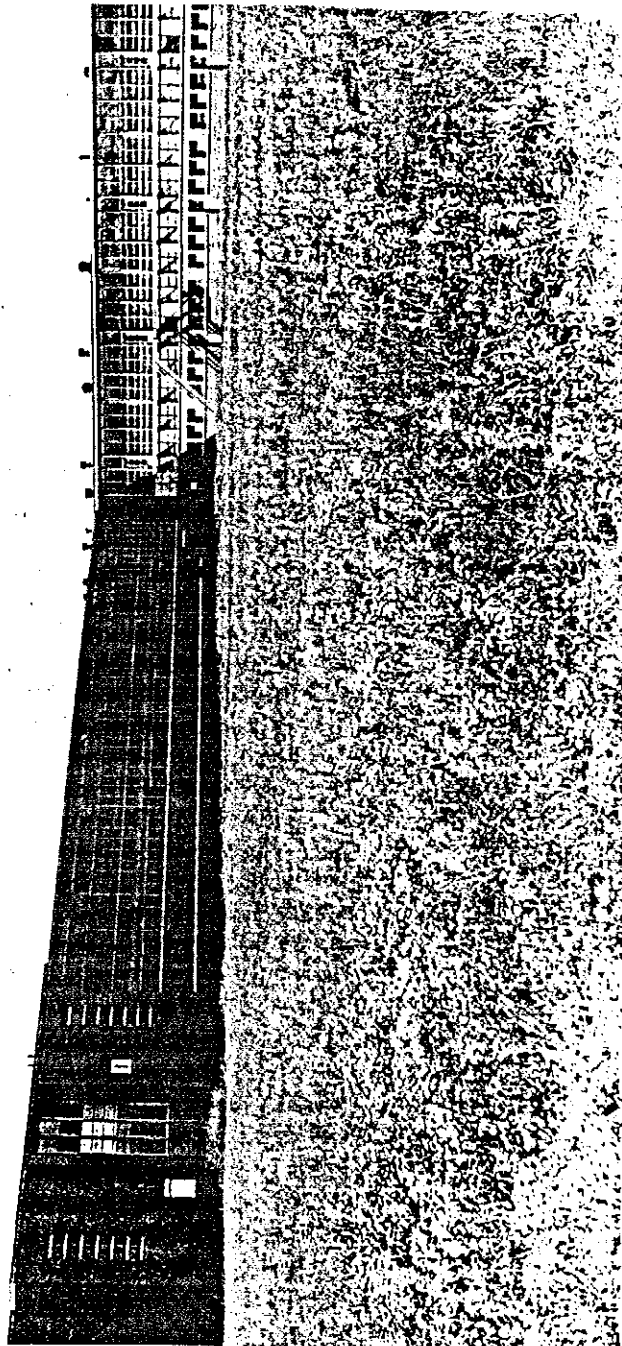


Figure 5: Originally designed as a .30-caliber ammunition shop, Building 1 currently houses SCAMP equipment for 5.56-mm ammunition production. It is almost identical in design to Building 2. (Source: "Master Planning, Phase II, Analysis of Existing Facilities," unpublished report, 1947, LCAAP Administrative Archives.)

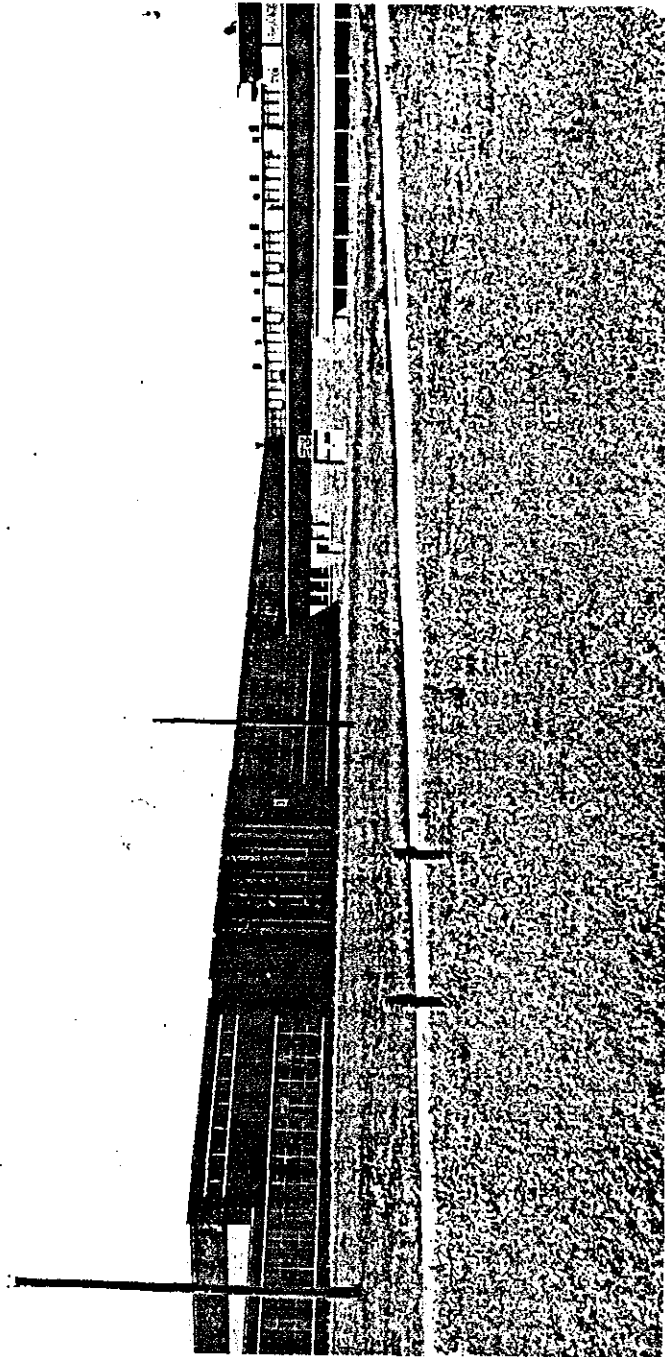


Figure 6: .50-Caliber Ammunition Shop (3). (Source: "Master Planning, Phase II, Analysis of Existing Facilities," unpublished report, 1947, ICAAP Administrative Archives.)

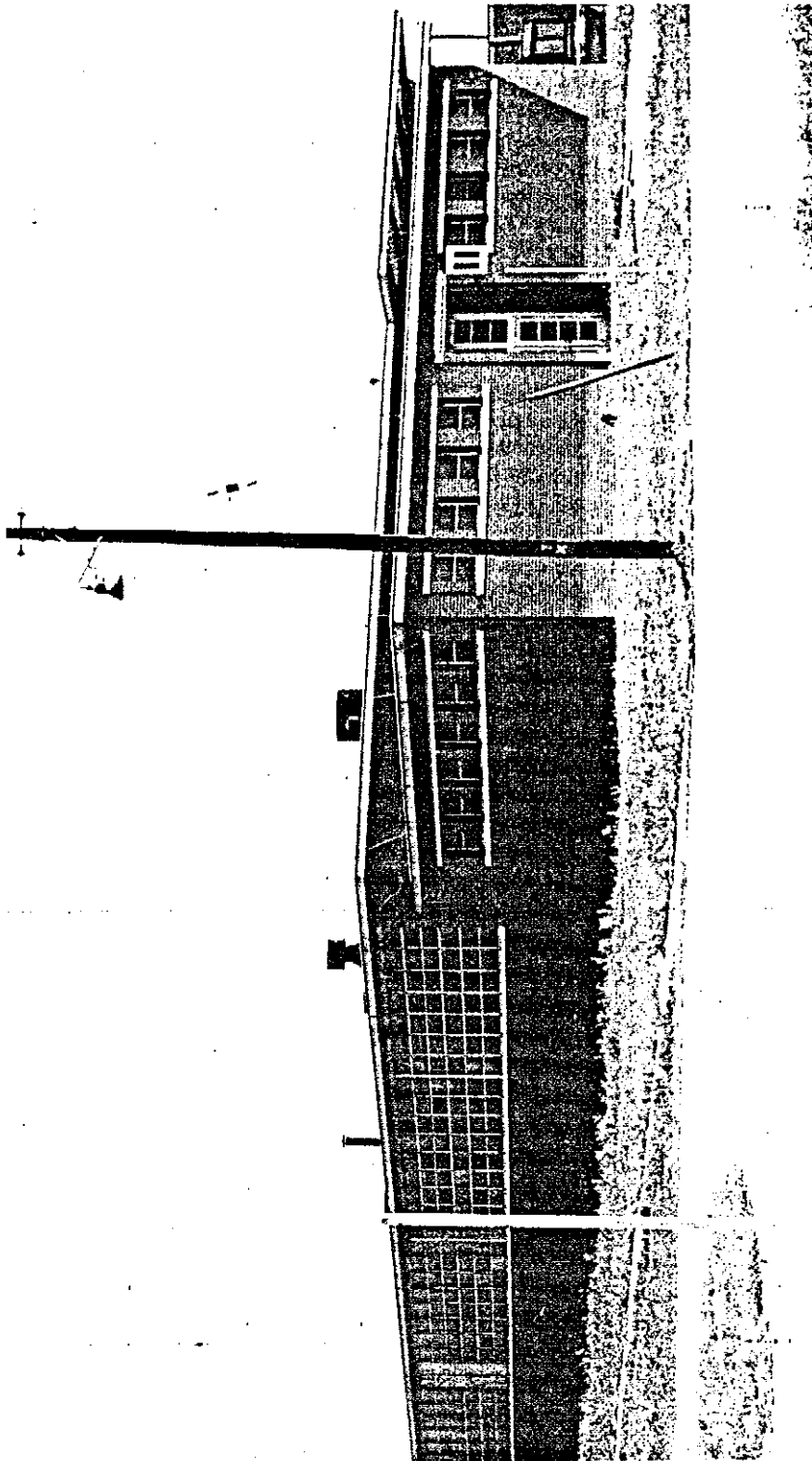


Figure 7: Lead Shop (11). (Source: "Master Planning, Phase II, Analysis of Existing Facilities," unpublished report, 1947, ICAAP Administrative Archives.)

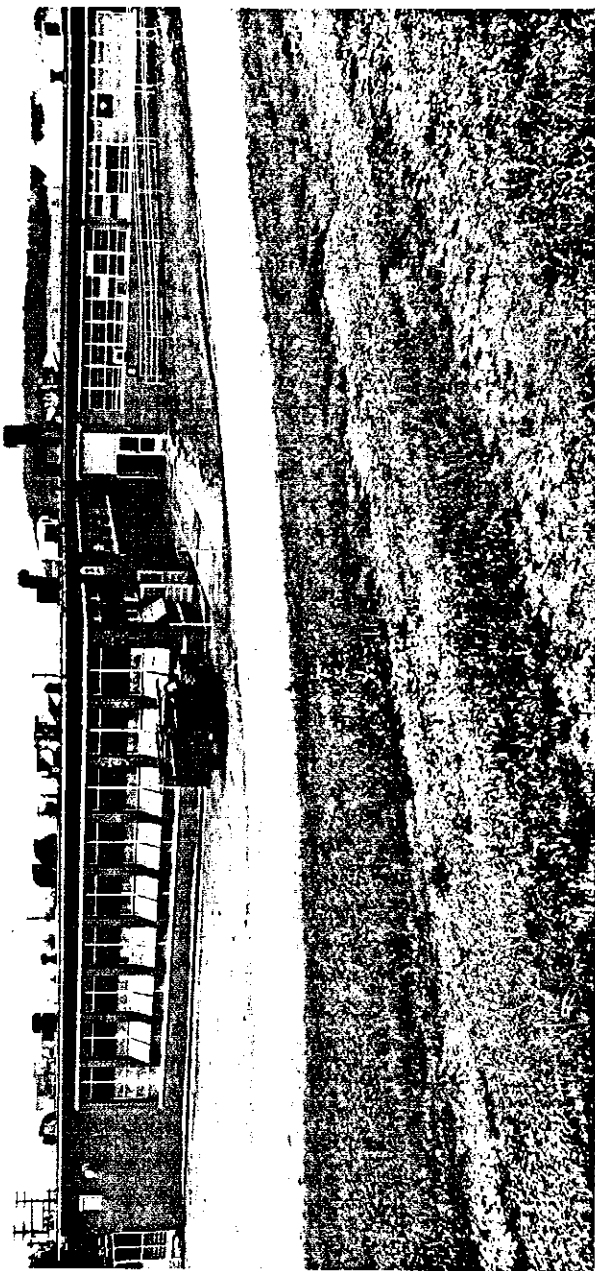


Figure 8: Primer Manufacturing Building (35). (Source: Field Inventory Photo, 1983, Jeffrey A. Hess, MacDonald and Mack Partnership.)



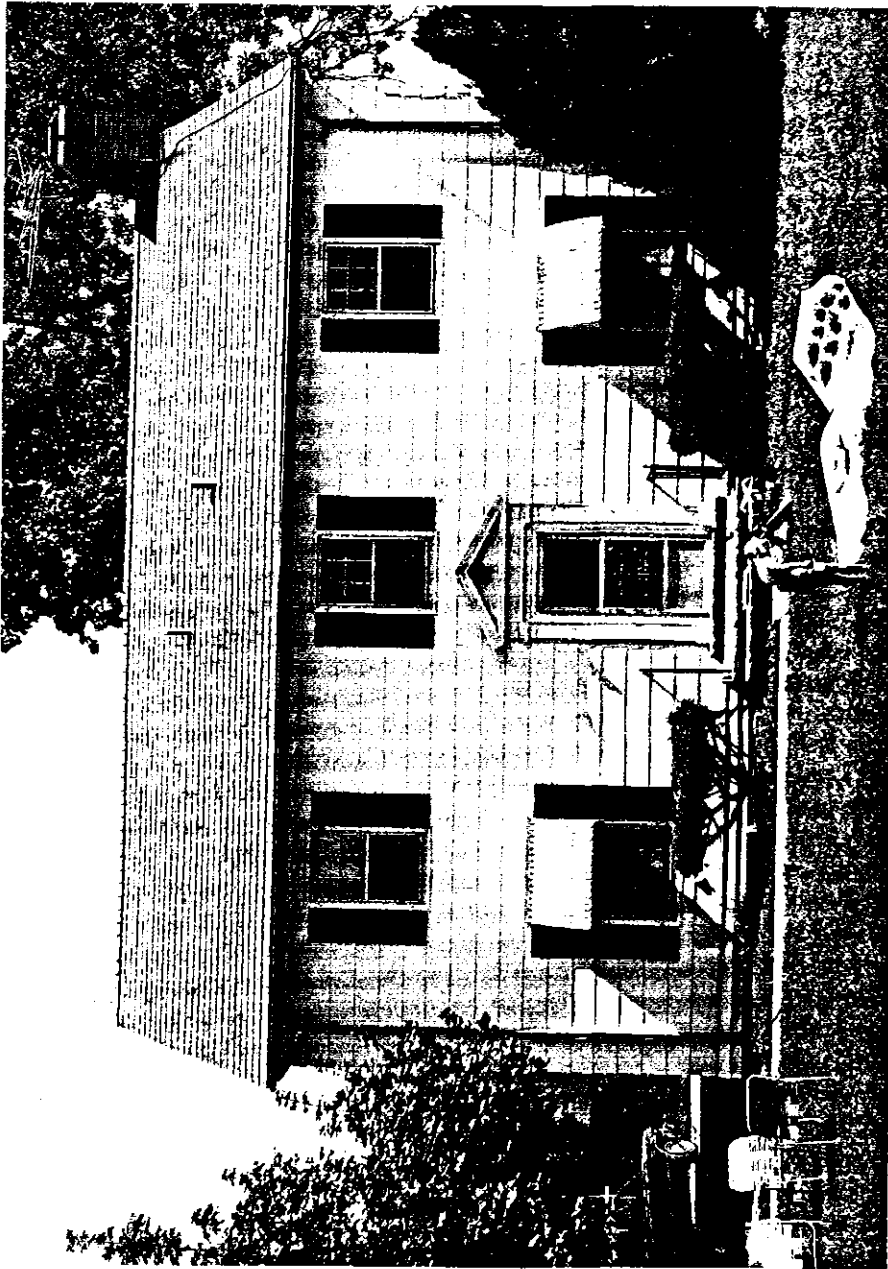


Figure 9: A representative residence in the plant's housing district.  
(Source: Field inventory photograph, 1983, Jeffrey A. Hess,  
MacDonald and Mack Partnership.)

equipment was laid away in place and the buildings were maintained by Ordnance Department personnel.<sup>11</sup>

Like the other first- and second-wave plants, the LCAAP based its production methods on standardized plans developed at Frankford Arsenal during the late 1930s, and for the most part, these procedures remained in effect throughout the war. Production techniques for .30- and .50-caliber ammunition were basically the same, and this also held true for the different types within each caliber -- armor-piercing, ball, incendiary, and tracer. Each completed cartridge consisted of four major components: cartridge case, primer, bullet, and propellant. All first- and second-wave plants manufactured the first three of these components, and then assembled them with propellant to produce a finished round of ammunition.<sup>12</sup>

Most of the manufacturing processes took place in long, two-story structures known as ammunition buildings, which occupied the north-central section of the plant. The first-floor of these buildings housed the bulk of the production machinery, while the second-floor primarily contained elevator-conveyor systems that serviced the production lines below by lifting away the partially finished products discharged by one bank of machines and then feeding them downward into the hoppers of the next bank. At the LCAAP, three buildings were devoted to .30-caliber production (Buildings 1, 2, 4) and two to .50-caliber production (Buildings 3, 3A).<sup>13</sup> The first step in manufacturing a completed round of ammunition was the formation of the cartridge case, which began with a small brass cup produced at other plants. The cup was gradually elongated and shaped by a

series of pressing, annealing, trimming, and stamping operations. This process has been described in the following way:

To wash off every trace of surface impurity [the cups] were rinsed in cold water, bathed in hot soapy water, rinsed again, and dried. Only then were they ready for the "first draw" during which a long, powerful punch was forced into each cup, making it deeper and thinner-walled -- more like a drinking glass than a cup. Four such draws were needed before the case reached its proper length, and after each draw, the cases [were] annealed, pickled [to remove the oxide film that formed during annealing], washed, dried, and trimmed. Company inspectors visually examined the cups after each operation to detect crooked heads, scratches, or other defects; they also gaged them for length, inside and outside diameter, and wall thickness. Next came the punching of a small pocket in the head of the case to hold the primer cup, followed by the heading operation that flattened the end of the case, stamped on it the plant initials and year of manufacture, and cut the extractor groove. The tapering and necking process was far more difficult than it appeared to be. It demanded careful annealing and precision working of the case to give it a narrow neck, sloping shoulders, and a slightly tapered body. Only the body was annealed -- not the head, for it had to remain hard -- so cases were slipped into holes in a revolving dial that exposed the bodies to a row of gas burners while the heads were <sup>14</sup>submerged in cold water. The next step was insertion of the primer.

Primer manufacturing at the LCAAP took place in Building 35, which, with its supporting storage and drying facilities, was isolated in the south-central section of the plant. The remote location of the primer manufacturing complex was intended to safeguard other manufacturing buildings from the hazard of accidental detonations. In the Primer Manufacturing Building, machines designed for blanking, forming, and cupping operations cut and shaped sheets of copper-and-zinc alloy into small, thin-walled cups, filled them with an explosive charge and then added a small "anvil." The completed primers were then delivered to "primer-insert wings" at the main ammunition buildings, where punching, seating, and crimping machines fitted them into the base ends of completed cartridge cases. The cartridge cases were then ready to be delivered to

the buildings' "loading wings," where they were filled with propellant and assembled with bullets.

Bullets consisted of two major parts: lead core and gilding-metal jacket. At the LCAAP's Lead Shop (Building 11) powerful extruding presses turned lead "pigs" into strands of wire, which were then cut and shaped into cores on swaging machines. Jacket production was a far more complicated process, and it took place in the main areas of the ammunition buildings.

Generally, the process was similar to cartridge-case manufacturing:

"Starting with strips of gilding metal, disks were stamped out and formed into cups which then went through a whole series of annealing, pickling, cleaning, and drawing operations, before they were ready to be slipped over lead [cores by means of bullet assembly machines]." <sup>15</sup> The completed bullets were shipped to the plant's loading wings for final assembly with propellant and primed cartridge cases. At the LCAAP, this operation was usually performed on a "straight-line" loading machine:

[Cartridge] cases are fed from a hopper to a dial under a powder-filled hopper. At the first station, a metered charge of powder is admitted to the cartridge cases, which is then moved to the next station, where a bullet, which has been fed from another hopper, is inserted. The bullets and cases are then carried to another station, where the bullets are forced into the cases. At the next station, a crimping tool comes down and closes the mouth of the cartridge around the mouth of the bullet. The finished cartridge is then turned over, dipped into . . . lacquer, and fed into a drying dial, from which it is later ejected from the machine.

Before the completed ammunition was packaged for shipment, a gaging machine checked each cartridge for proper size and weight.

In the summer of 1944, the LCAAP's production program was expanded by the addition of a 20-mm ammunition loading operation in Building 3A. Using converted .50-caliber equipment and 20-mm shell components manufactured at other plants, this operation produced approximately 17.3 million completed rounds, which were used mainly in aircraft canon. The 20-mm lines remained in production until the summer of 1945, when they were placed in standby condition.<sup>17</sup>

#### KOREAN WAR

The LCAAP was reactivated for production in December 1950, and during the next five years, it experienced considerable new construction and technological expansion. After the Korean War, the LCAAP continued to function as an active manufacturing facility, although several of its production lines reverted to standby status.

#### Construction

During 1950-1955, approximately 135 buildings were constructed at the LCAAP, with about half designed for production purposes, and the other half for maintenance, storage, and utilities. The major new production facilities were a Test-Range Building (Building 45), a 20-mm Load-and-Pack Building (Building 65), a 20-mm Detonator-and-Booster Building (Building 139), and a 20-mm Fuze-Assembly Building (Building 142) (Figures 10, 11). These structures differed from the substantial masonry construction of the plant's original production buildings in their use of more economical and less durable materials, such as brick veneer (Building

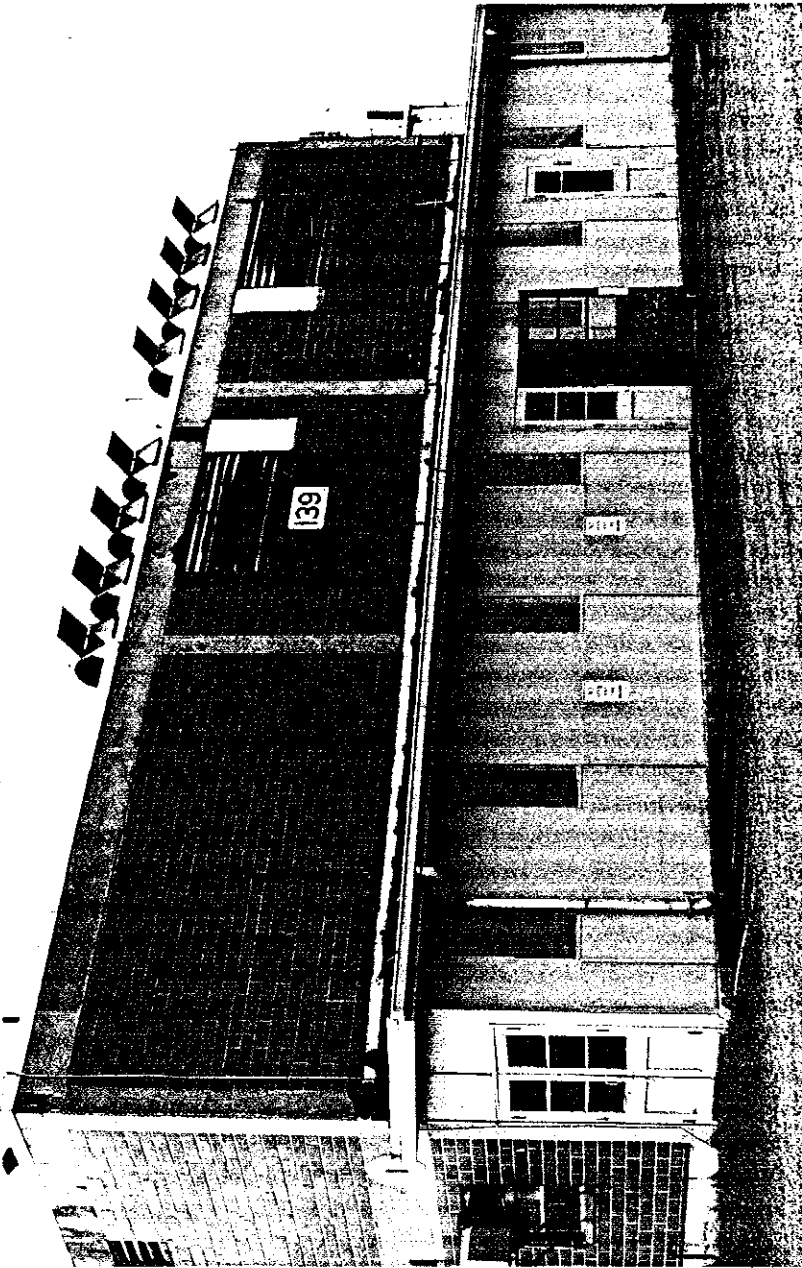


Figure 10: 20-mm Detonator-and-Booster Building (139). (Source: Field inventory photograph, 1983, Jeffrey A. Hess, MacDonald and Mack Partnership.)



Figure 11: 20-mm Fuze-Assembly Building (142). (Source: Field inventory photograph, 1983, Jeffrey A. Hess, MacDonald and Mack partnership.)

45), structural-clay-tile cladding (Buildings 65, 142), styrofoam blow walls (Buildings 139, 142), and sheet-metal panels (Building 65). New warehouse construction was also undertaken with an eye toward economy. For example, Buildings 121A-121G, which added one-half-million square feet of storage space, were identical, pre-fabricated, Butler-type structures with corrugated-asbestos cladding. The 1950s construction program was also responsible for modifying several of the plant's original buildings. The Security Office (Building 6) was enlarged with an extensive warehouse addition; one ammunition building (Building 3A) was rehabilitated with a new roof and second-floor addition; and three other ammunition buildings (Buildings 1, 2, 4) and the Primer Manufacturing Building (Building 35) received new production wings.<sup>18</sup>

#### Technology

In December 1951, Remington Arms Company, Inc. returned to the LCAAP to serve as contractor operator, and within five months, the plant was once again producing .30-caliber, .50-caliber, and .20-mm ammunition. Closely following World-War-II practices, the LCAAP manufactured approximately 3.6 billion finished rounds of ammunition during the Korean War, with annual production in 1952 accounting for about half the total output. In 1956, the .30-caliber lines in Building 4 and the .50-caliber lines in Building 3 were laid away in place, and the plant's annual production dropped to about 200 million rounds, where it remained for the rest of the 1950s.<sup>19</sup>



As the Korean War drew to a close in the summer of 1953, the government and contractor staff at the LCAAP turned their attention to expanding the plant's technological capabilities and streamlining its production methods. In 1954, a portion of the .30-caliber equipment in Building 1 was retooled for the production of 7.62-mm ammunition, which had been selected as the standard NATO round. And in 1955, the .20-mm cartridge-case lines in Building 3A were partially retooled for the manufacture of 30-mm cases. The .20-mm and .30-mm case operations apparently remained a four-draw process, but the .30-caliber and 7.62-mm lines were reduced from four draws to three. During the mid-1950s, the LCAAP also experienced a major expansion of its 20-mm capabilities with the introduction of projectile lines in Building 3A (which housed the 20-mm case-production equipment); the conversion of two former warehouses (Buildings 12A, 12B) into fuze metal-parts production facilities; and the construction of a fuze-assembling complex (Buildings 139, 142) and a load-and-pack facility (Building 65).<sup>20</sup>

The 20-mm fuze was a small metal canister that was inserted into the tip of the finished projectile. The fuze body contained an impact-sensitive detonator charge and a booster charge. The detonator charge was mounted in an arming rotor designed to thrust the detonator into impact position when the cartridge fired. Upon impact, the detonator set off the booster charge, which in turn detonated the main explosive charge in the projectile body. The plant's Primer Manufacturing Building (Building 35) produced detonator and booster cups. The cups were then delivered to the new Booster-and-Detonator Building (Building 139) where they were charged with explosives and sealed with foil. The detonators were attached to rotor

assemblies, and along with the boosters, they were delivered to the new Fuze-Assembly Building (Building 142) for insertion into fuze bodies. At the new Load-and-Pack Building (Building 65), fuzes, cartridge cases, and projectiles were assembled with explosive and propellant into complete 20-mm rounds. The new projectile, fuze metal-parts, fuze-assembly, and load-and-pack lines went into pilot production in 1956.<sup>21</sup>

#### VIETNAM WAR TO PRESENT

Unlike other government-owned, contractor-operated munitions plants that were abruptly reactivated for the Vietnam War, the LCAAP had been an active manufacturing facility under the supervision of its original contractor-operator since 1950. This administrative and technological continuity enabled the LCAAP to meet the dramatically increased production schedules of the mid-1960s with relatively few difficulties. With the resolution of the Southeast Asian conflict, the LCAAP curtailed its output, but continued in operation. At present, it is the nation's only active, government-owned, contractor-operated manufacturing facility for small arms ammunition.

#### Construction

Approximately 35 new buildings were constructed at the LCAAP during the 1960s and 1970s. The most prominent of these structures were two identical, sheet-metal clad warehouses (Buildings 121H, 121J) erected in 1967, which added a total of 32,000 square feet of storage space.

The other new buildings were minor storage, utilities, and maintenance facilities.<sup>22</sup>

### Technology

Reflecting the sudden build-up of American forces in Vietnam, the LCAAP in 1966 tripled its average annual production of the previous five years to about 1.4 billion rounds of .30-caliber, .50-caliber, and 20-mm ammunition. In 1966 the LCAAP also began to produce 5.56-mm ammunition for the M16 rifle, which was being introduced on a large scale in Vietnam. This ammunition was manufactured primarily on retooled .30-caliber equipment. Despite the elimination of some production steps and the introduction of certain pieces of modern machinery, such as high-speed, blanking-and-forming presses in the Primer Manufacturing Building (Building 35), the LCAAP's production technology for small arms ammunition continued to reflect basic World-War-II practices, and much of the plant's original production equipment remained in use (Figure 12). After the withdrawal of American troops from Vietnam, the LCAAP's production schedules sharply declined, and by the late 1970s, the plant's annual output had stabilized at about 200 million rounds.<sup>23</sup>

The first major change in the LCAAP's small arms ammunition operation occurred in 1977, when a new generation of manufacturing equipment for 5.56-mm rounds was installed in Building 1. Funded by the government's Small Caliber Ammunition Modernization Program (SCAMP), the equipment had been developed by Frankford Arsenal and private contractors during the 1960s, and then tested at Twin Cities Ammunition Plant in New Brighton,

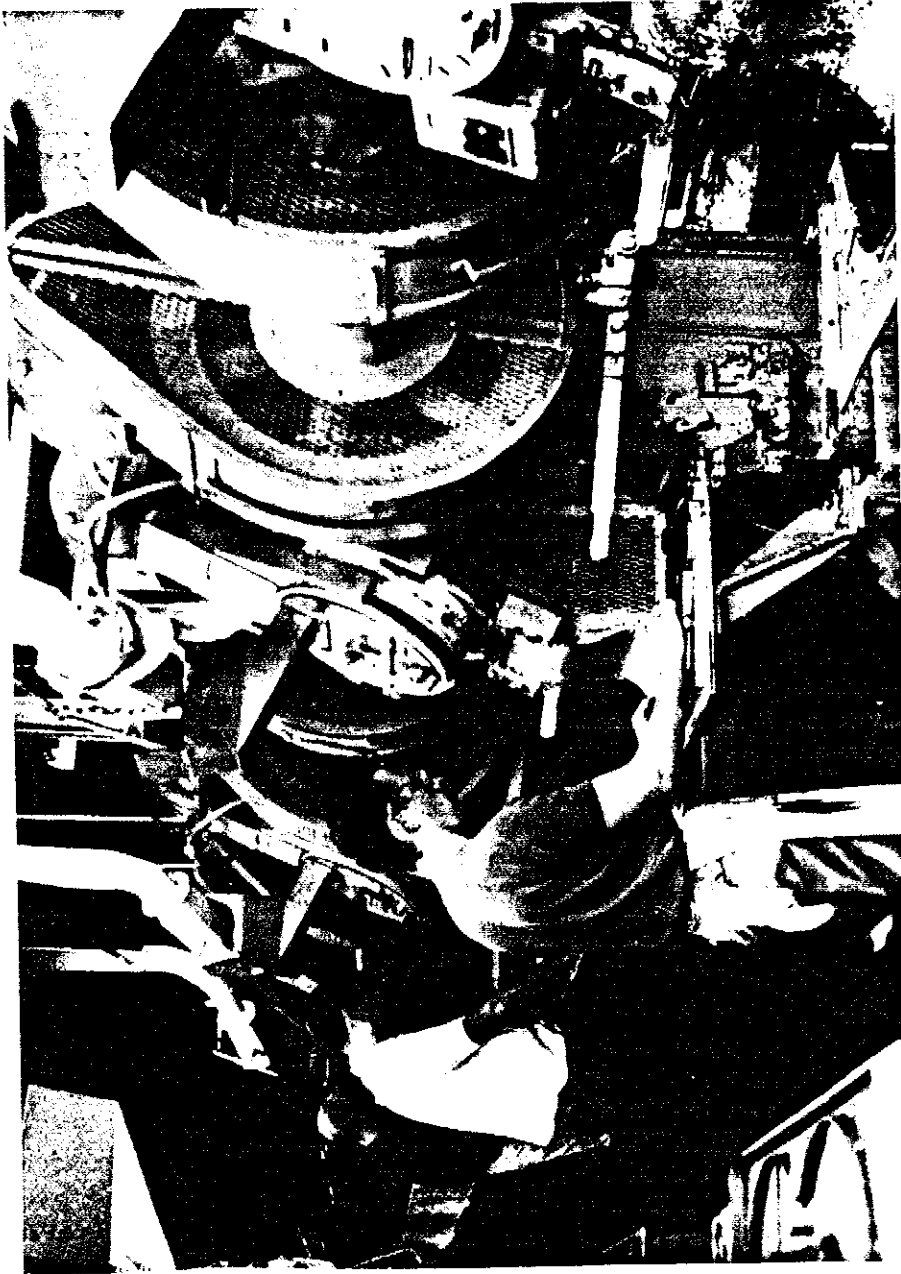


Figure 12: This 1968 photograph shows workers tending World-War-II-vintage .30-caliber draw presses that had been retooled for 7.62-mm cartridge-case production during the Vietnam War. (Source: LCAAP Administrative Archives.)

Minnesota during the early 1970s.<sup>24</sup> The SCAMP system consisted of an integrated series of highly automated, production units, or "submodules," capable of manufacturing 1,200 completed components per minute. The five major submodules were cartridge-case production, primer insert, bullet production, load-and-assemble, and packaging. Employing compact, high-speed, computer-monitored, rotary machines, the SCAMP system used only a fraction of the manpower and space required by conventional production methods (Figures 13, 14). The following description of the cartridge-case submodule outlines the basic details of the SCAMP innovation:

The Case Submodule . . . represents a significant modernization breakthrough in the manufacture of ammunition casings. The system utilizes a series of rotary turret presses to perform various metal-working operations. The overall system is controlled by a master control console, and carefully oversees the movement of cases from one operation to another. Parts are carried between the presses in a captive work oriented position by a series of transfer chains. Between each of the major operating stations are transfer/eject turrets. These are isolated locations at which sample components are ejected for inspection. Initial drawing operations for the cartridge case are performed in special unique presses. Each press contains 24 tool stations with individual tools operated by a fixed cam as the turret rotates around it. Tools and other parts subject to wear are modular and are so designed as to afford replacement in a few minutes. The process which forms the head and primer pocket in the cartridge case is the heading operations and represents the most difficult to perform. Forces are exerted from both the bottom and top of the tool module. The head turn and piercing operations are done on turrets similar to those used in draw operations. The cartridge cases are then put through an annealing operation. The cases are passed through an induction annealing coil on a specially constructed transfer chain. The cartridge case is then introduced to the two tapering operations (initial and final). The case is carried into the tapering press on a chain held clip, which holds it in place making it easily accessible to the modular tool tapering equipment. The case mouth is trimmed to obtain the correct overall case length. Trimmed scrap is removed from the work area through a length of copper tubing. The final operation by the cartridge case submodule is performed in the mouth and neck anneal, wash and stress relief unit.

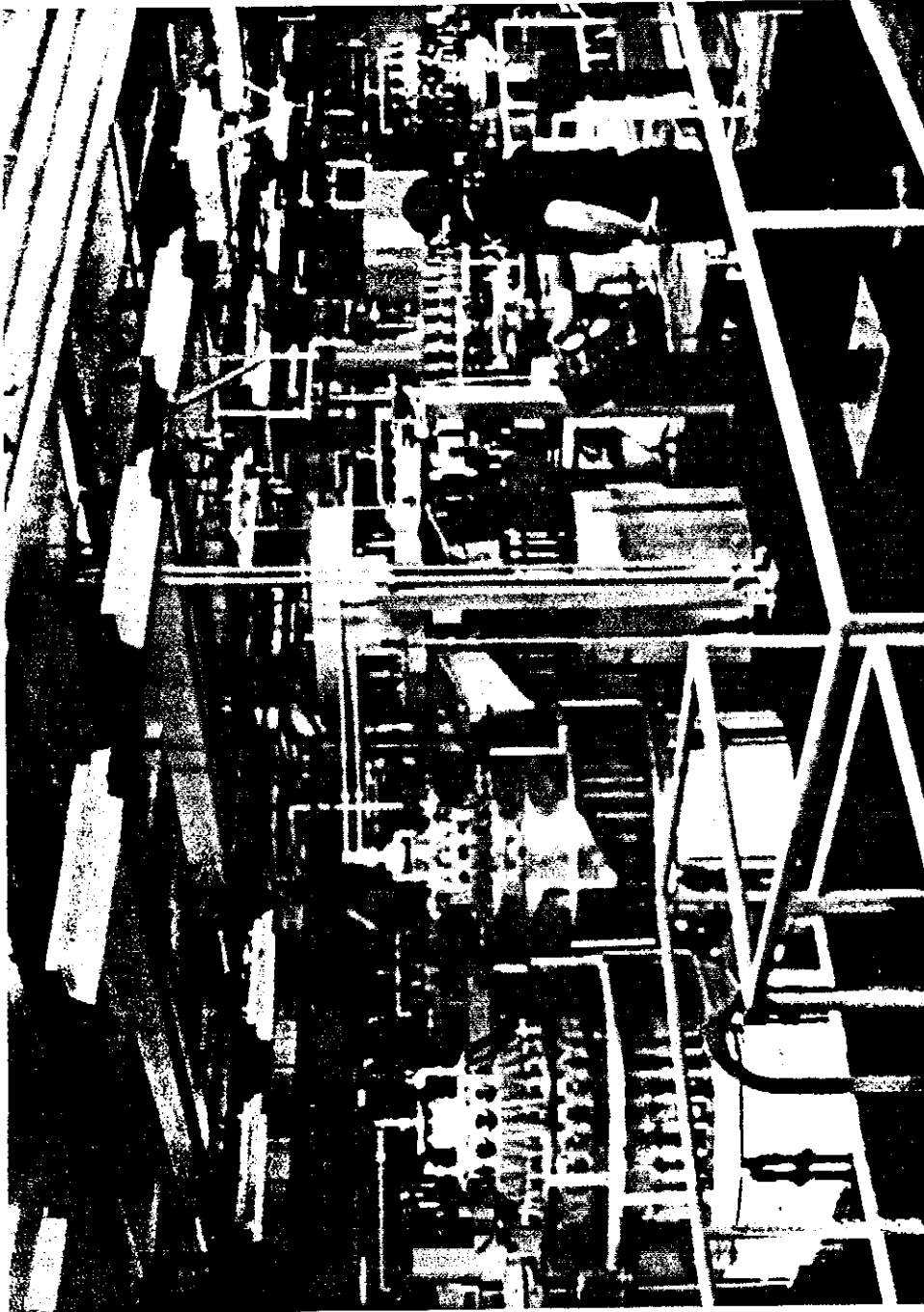


Figure 13: High speed, rotary, draw presses comprising SCAMP submodule for 5.56-mm cartridge-case production. (Source: LCAAP Administrative Archives.)

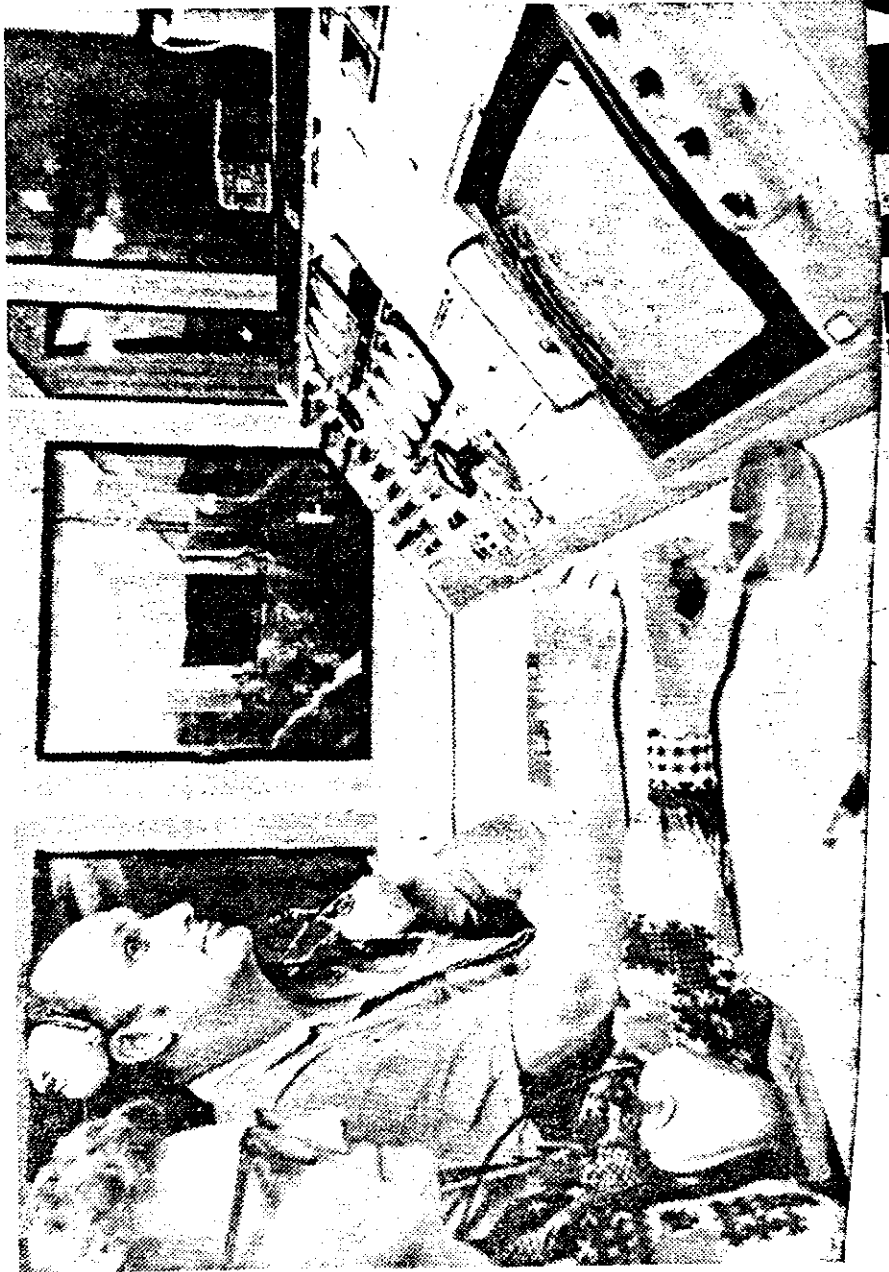


Figure 14: Technicians tending computer console that monitors SCAMP submodule for 5.56-mm cartridge-case production. (Source: Kansas City Star, June 23, 1977.)

Apart from the 5.56-mm SCAMP machinery in Building 1, and the 20-mm operation in Buildings 65, 139, and 142, the LCAAP's production equipment is still largely World-War-II vintage. This is especially true for the .50-caliber lines in Building 3 and the lead-shop equipment in Building 11.

#### NOTES

1. Harry C. Thomson and Lida Mayo, The Ordnance Department: Procurement and Supply (Washington, D.C.: Office of the Chief of Military History, Department of the Army, 1960), pp. 191-192; see also Small Arms Ammunition, A History of an Industry, vol. 1, (No. pl.: Ammunition Branch, Small Arms Division, Office of Chief of Ordnance, c. 1945), pp. 69-71.
2. Thomson and Mayo, pp. 194-196. The importance of the initial production planning at Frankford Arsenal is underscored in Charles O. Herb, "Small Arms Ammunition," Machinery, 49 (April 1943), 136. The first-wave plants were authorized in the fall of 1940, and in addition to the Lake City location, they were constructed at Denver, Colorado and St. Louis, Missouri. The second-wave plants were authorized in the spring of 1941 and were built at Des Moines, Iowa; New Brighton, Minnesota; and Salt Lake City, Utah. The Ordnance Department eventually established twelve plants for the manufacture of small arms ammunition during World War II. Most of the later plants, however, were set up in existing factory facilities with only limited new construction; see Thomson and Mayo, pp. 220-203; Small Arms Ammunition, vol. 2, pp. 167-177.
3. Small Arms Ammunition, vol. 1, pp. 107, 143.
4. The conformance of the LCAAP site with selection criteria is discussed in Reference #30, "Proposed Small Arms Ammunition Plant in the Environs of Kansas City, Missouri," Ordnance Department memo, October 14, 1940, in Small Arms Ammunition, vol. 2, pp. 113-115. On the importance of railroad proximity and the availability of gas, see "War Plants Need Much Trackage," Railway Age, 114 (January 2, 1943), 40-42; "Use of Gas in the Production of Munitions," Gas Age, 87 (March 27, 1941), 21-23; "Gas--A Major Tool in War Production," Gas Age, 90 (July 16, 1942), 38-42. The site's topography and use is noted in Louisa Stephens, "A Glimpse into the History of Lake City, Missouri," unpublished, n.d., n.p., in Lake City Folder, Mid-Continental Public Library, North Independence Branch, Independence, Missouri. Lake City, which gave the plant its name, was a way station on the Missouri Pacific Railroad; it was annexed by the City of Independence in 1974; see "Gunfire Doesn't Rattle Lake City," Kansas City Times, July 5, 1975.



5. Small Arms Ammunition, vol. 1, p. 151. In December 1941, responsibility for munitions-plant construction was transferred from the Quartermaster Corps to the Army Corps of Engineers, which then finished the LCAAP project; see Lenore Fine and Jesse A. Remington, The Corps of Engineers: Construction in the United States (Washington, D.C.: Office of the Chief of Military History, United States Army, 1972), pp. 467-476.
6. "Unit History, Lake City Army Ammunition Plant, Independence, Missouri, 30 December 1940 - 31 December 1967," unpublished report, 1968, pp. 8-9, LCAAP Administrative Archives.
7. Thomas J. Holleman and James P. Gallagher, Smith, Hinchman & Grylls (Detroit: Wayne State University Press for Smith, Hinchman & Grylls Associates, Inc., 1978), pp. 143, 145; Smith, Hinchman & Grylls, Inc., "Small Arms Ammunition Plants," Architectural Forum 77 (December 1942), 61-92; John J. Woolfenden, "Small Arms Munitions," Heating & Ventilation, 40 (June 1943), 38-51; author's interview with Jim Braathen, Building Manager, Smith, Hinchman & Grylls, August 24, 1983.
8. Smith, Hinchman & Grylls, "Small Arms Ammunition Plants," 65.
9. Smith, Hinchman & Grylls, 75-75, 88.
10. "Lake City Ordnance Plant History, August 7, 1940 to March 31, 1943," unpublished report prepared by Remington Arms Company, Inc., 1943, p. 35; see also "Summary of Buildings at Lake City Arsenal as of 1 April 1946," mimeographed memo, April 26, 1946, LCAAP Administrative Archives.
11. "Unit History, 1940-1967," p. 21; Thomson and Mayo, p. 188. The plant's laid away equipment is described in "Master Planning, Phase II, Analysis of Existing Facilities," unpublished report, 1947, LCAAP Administrative Archives.
12. The discussion of production methods for small arms ammunitions relies heavily on the following sources: Thomson and Mayo, pp. 204-207; herb, "Small Arms Ammunition from One of Remington's New Plants," Machinery, 49 (April, June 1943), 136-151, 142-151. These sources provided detailed technological descriptions that were authenticated for the LCAAP inspecting the plant's surviving equipment and by reviewing the World-War-II production procedures outlined in "Master Planning, Phase II, Analysis of Existing Facilities," 1947. Subsequent citations will be restricted to direct quotations.
13. Buildings 3A and 4 were later additions to the plant and were not completed until late 1942. Reflecting the general haste and economy of wartime construction, they were one-story structures that lacked the architectural detailing of the earlier ammunition buildings. Buildings 1 and 2 produced standard .30-caliber ammunition for the Garand Rifle, the basic weapon of American infantry troops during World War II. Building 4 produced .30-caliber carbine ammunition. The carbine was a lightweight rifle similar in design to the Garand,

but with shorter range; see Thomson and Mayo, pp. 168-169. Manufacturing techniques for both types of .30-caliber ammunition were similar.

14. Thomson and Mayo, p. 205.
15. Thomson and Mayo, p. 206.
16. Herb, (June 1943), 147.
17. On the 20-mm operation, see Mabel R. Bradfield, "History of the Lake City Ordnance Plant, Chapter X, Sixth Quarterly Supplement, 1 April 1944 to 1 July 1944," unpublished report, pp. 142-144; Bradfield, "History of the Lake City Ordnance Plant, Chapter XIII, Ninth Quarterly Supplement, 1 January 1945 to 1 April 1945," unpublished report, p. 227; "Lake City Arsenal History Summary, 1 July 1946 to 30 June, 1951," unpublished report, Appendix 4, pp. 1-2; "Unit History, 1940-1967," Appendix E, LCAAP Administrative Archives.
18. 16 Years of Progress (Independence, Mo.: Remington Arms Company, Inc., 1967), p. 27; "Semi-Annual Historical Summary, Lake City Arsenal, 1 July 1952 to 31 December 1952," unpublished report, pp. 5, 14, LCAAP Administrative Archives; Real Property Inventory, computer printout, March 31, 1982, LCAAP Real Property Office Archives.
19. "Unit History, 1940-1967," Appendix H; "Lake City Arsenal, Historical Summary 1946-1951;" "Semiannual Historical Summary, Lake City Arsenal, July 1, 1956 Through December 31, 1956," unpublished report prepared by Remington Arms Company, Inc., 1957, p. 2, LCAAP Administrative Archives.
20. "Semiannual Historical Summary, Lake City Arsenal, 1 January 1955 to 30 June 1955," unpublished report, p. 12; "Semiannual Historical Summary, Lake City Arsenal, 1 July 1954 to 31 December 1954," unpublished report, p. 14; "Semiannual Historical Summary, July 1, 1957 Through December 31, 1957," unpublished report prepared by Remington Arms Company Inc, 1957, pp. 1-2. LCAAP Administrative Archives.
21. "Semiannual History Summary, July 1, 1956-December 31, 1956," p.2.
22. Real Property Inventory.
23. "Annual Historical Summary, Lake City Army Ammunition Plant, 1 July 1973 to 30 June 1974," unpublished report, p. m-1, LCAAP Administrative Archives.
24. For background information on the development and testing of the SCAMP equipment, see Small Caliber Ammunition Modernization Program (No pl.: U. S. Army Armament Command, n.d.), n.p.; "Twin Cities Army Ammunition Plant Information Brochure," unpublished, c. 1980, Twin Cities Army Ammunition Plant Administrative Archives, New Brighton, Minnesota.

25. Small Caliber Ammunition Modernization Program.

### Chapter 3

#### PRESERVATION RECOMMENDATIONS

##### BACKGROUND

Army Regulation 420-40 requires that an historic preservation plan be developed as an integral part of each installation's planning and long-range maintenance and development scheduling.<sup>1</sup> The purpose of such a program is to:

- . Preserve historic properties to reflect the Army's role in history and its continuing concern for the protection of the nation's heritage.
- . Implement historic preservation projects as an integral part of the installation's maintenance and construction programs.
- . Find adaptive uses for historic properties in order to maintain them as actively used facilities on the installation.
- . Eliminate damage or destruction due to improper maintenance, repair, or use that may alter or destroy the significant elements of any property.
- . Enhance the most historically significant areas of the installation through appropriate landscaping and conservation.

To meet these overall preservation objectives, the general preservation recommendations set forth below have been developed:

##### Category I Historic Properties

All Category I historic properties not currently listed on or nominated to the National Register of Historic Places are assumed to be eligible for

nomination regardless of age. The following general preservation recommendations apply to these properties:

- a) Each Category I historic property should be treated as if it were on the National Register, whether listed or not. Properties not currently listed should be nominated. Category I historic properties should not be altered or demolished. All work on such properties shall be performed in accordance with Sections 106 and 110(f) of the National Historic Preservation Act as amended in 1980, and the regulations of the Advisory Council for Historic Preservation (ACHP) as outlined in the "Protection of Historic and Cultural Properties" (36 CFR 800).
- b) An individual preservation plan should be developed and put into effect for each Category I historic property. This plan should delineate the appropriate restoration or preservation program to be carried out for the property. It should include a maintenance and repair schedule and estimated initial and annual costs. The preservation plan should be approved by the State Historic Preservation Officer and the Advisory Council in accordance with the above-referenced ACHP regulation. Until the historic preservation plan is put into effect, Category I historic properties should be maintained in accordance with the recommended approaches of the Secretary of Interior's Standards for Rehabilitation and

Revised Guidelines for Rehabilitating Historic Buildings<sup>2</sup> and  
in consultation with the State Historic Preservation Officer.

- c) Each Category I historic property should be documented in accordance with Historic American Buildings Survey/Historic American Engineering Record (HABS/HAER) Documentation Level II, and the documentation submitted for inclusion in the HABS/HAER collections in the Library of Congress.<sup>3</sup> When no adequate architectural drawings exist for a Category I historic property, it should be documented in accordance with Documentation Level I of these standards. In cases where standard measured drawings are unable to record significant features of a property or technological process, interpretive drawings also should be prepared.

#### Category II Historic Properties

All Category II historic properties not currently listed on or nominated to the National Register of Historic Places are assumed to be eligible for nomination regardless of age. The following general preservation recommendations apply to these properties:

- a) Each Category II historic property should be treated as if it were on the National Register, whether listed or not. Properties not currently listed should be nominated. Category II historic properties should not be altered or demolished. All work on such properties shall be performed

in accordance with Sections 106 and 110(f) of the National Historic Preservation Act as amended in 1980, and the regulations of the Advisory Council for Historic Preservation (ACHP) as outlined in the "Protection of Historic and Cultural Properties" (36 CFR 800).

- b) An individual preservation plan should be developed and put into effect for each Category II historic property. This plan should delineate the appropriate preservation or rehabilitation program to be carried out for the property or for those parts of the property which contribute to its historical, architectural, or technological importance. It should include a maintenance and repair schedule and estimated initial and annual costs. The preservation plan should be approved by the State Historic Preservation Officer and the Advisory Council in accordance with the above-referenced ACHP regulations. Until the historic preservation plan is put into effect, Category II historic properties should be maintained in accordance with the recommended approaches in the Secretary of the Interior's Standards for Rehabilitation and Revised Guidelines for Rehabilitating Historic Buildings<sup>4</sup> and in consultation with the State Historic Preservation Officer.

- c) Each Category II historic property should be documented in accordance with Historic American Buildings Survey/Historic American Engineering Record (HABS/HAER) Documentation Level

II, and the documentation submitted for inclusion in the HABS/HAER collections in the Library of Congress.<sup>5</sup>

### Category III Historic Properties

The following preservation recommendations apply to Category III historic properties:

- a) Category III historic properties listed on or eligible for nomination to the National Register as part of a district or thematic group should be treated in accordance with Sections 106 and 110(f) of the National Historic Preservation Act as amended in 1980, and the regulations of the Advisory Council for Historic Preservation as outlined in the "Protection of Historic and Cultural Properties" (36 CFR 800). Such properties should not be demolished and their facades, or those parts of the property that contribute to the historical landscape, should be protected from major modifications. Preservation plans should be developed for groupings of Category III historic properties within a district or thematic group. The scope of these plans should be limited to those parts of each property that contribute to the district or group's importance. Until such plans are put into effect, these properties should be maintained in accordance with the recommended approaches in the Secretary of the Interior's Standards for Rehabilitation and Revised



Guidelines for Rehabilitating Historic Buildings<sup>6</sup> and in consultation with the State Historic Preservation Officer.

- b) Category III historic properties not listed on or eligible for nomination to the National Register as part of a district or thematic group should receive routine maintenance. Such properties should not be demolished, and their facades, or those parts of the property that contribute to the historical landscape, should be protected from modification. If the properties are unoccupied, they should, as a minimum, be maintained in stable condition and prevented from deteriorating.

HABS/HAER Documentation Level IV has been completed for all Category III historic properties, and no additional documentation is required as long as they are not endangered. Category III historic properties that are endangered for operational or other reasons should be documented in accordance with HABS/HAER Documentation Level III, and submitted for inclusion in the HABS/HAER collections in the Library of Congress.<sup>7</sup> Similar structures need only be documented once.

#### CATEGORY I HISTORIC PROPERTIES

There are no Category I historic properties at the LCAAP.

## CATEGORY II HISTORIC PROPERTIES

There are no Category II historic properties at the LCAAP.

## CATEGORY III HISTORIC PROPERTIES

5.56-mm, SCAMP, Ammunition Building (Building 1)

7.62-mm Ammunition Building (Building 2)

.50-Caliber Ammunition Shop (Building 3)

Administration Building (Building 5)

Tool-and-Gauge Building (Building 10)

Lead Shop (Building 11)

Boiler House (Building 15)

Primer Manufacturing Building (Building 35)

- . Background and significance. Constructed in 1941, these eight buildings (Figures 2-8) were designed by Smith, Hinchman & Grylls, Inc. of Detroit, and served as prototypes for the major administrative and manufacturing facilities built at first- and second-wave, small arms ammunition manufacturing plants in Denver, Colorado; Des Moines, Iowa; New Brighton, Minnesota; and Salt Lake City, Utah (see Chapter 2, pages 19-22). The Administration Building (Building 5) and Tool-and-Gauge Building (Building 10) survive in virtually their original form. Although the other six buildings have been altered by post-World-War-II additions, they retain the characteristic safety-and-defense features and clean-lined detailing of their original design. The .50-Caliber Ammunition Building (Building 3) has

the added distinction of housing the nation's only intact, World-War-II-vintage, .50-caliber production lines (Figure 15). This equipment is currently in active production. Because these eight buildings are important design prototypes of the World-War-II era, they are Category III historic properties.

- . Condition and potential adverse impact. The properties are in good condition and receive routine maintenance. Some are standby facilities, and others are actively used for manufacturing purposes. There are no current plans to alter or demolish these properties.
  
- . Preservation options. See the general preservation recommendations at the beginning of this chapter for Category III historic properties not eligible for the National Register. Because of its rarity and intactness, the .50-caliber production equipment in Building 3 should receive HAER Level II documentation. When this machinery is retired from active service, representative examples should be presented to an appropriate museum of military or technological history for preservation.



Figure 15: Photographed in 1944, these pickling and wash units are part of the original .50-caliber production equipment that is currently laid away in place in Building 3. (Source: ICAAP Administrative Archives.)

NOTES

1. Army Regulation 420-40, Historic Preservation (Headquarters, U.S. Army: Washington, D.C., 15 April 1984).
2. National Park Service, Secretary of Interior's Standards for Rehabilitation and Revised Guidelines for Rehabilitating Historic Buildings, 1983 (Washington, D.C.: Preservation Assistance Division, National Park Service, 1983).
3. National Park Service, "Archeology and Historic Preservation; Secretary of the Interior's Standards and Guidelines," Federal Register, Part IV, 28 September 1983, pp. 44730-44734.
4. National Park Service, Secretary of the Interior's Standards.
5. National Park Service, "Archeology and Historic Preservation."
6. National Park Service, Secretary of the Interior's Standards.
7. National Park Service, "Archeology and Historic Preservation."

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